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Case Report

Radial approach is better than the femoral one in anomalous high RCA take-off from the left-anterior part of the ascending aorta

Eyvaz Abbasov (MD)[a,*], Imadeddin Bagirov (MD)[b], Afag Akhundova (MD)[b]

[a] Department of Radiology, M. Topchubashov Surgical Center, Sharifzade 196 Str., Baku AZ1122, Azerbaijan
[b] Department of Cardiac Surgery, M. Topchubashov Surgical Center, Baku, Azerbaijan

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ABSTRACT

An anomalous right coronary artery (RCA) with a high anterior take-off from ascending aorta is an uncommon and technically challenging vessel to cannulate. There are only a few reports in the literature describing this anomaly. Some of them consider it as a "very rare" or even "extremely rare" anomaly. Here we present a case of anomalous RCA arising from antero-left part of the ascending aorta, 3 cm above sinotubular junction. It was impossible to cannulate the anomalous vessel from the femoral approach by two experienced operators, despite using various catheters. The vessel could easily be engaged from the right radial approach at first attempt. We conclude that in patients with anomalous high RCA take-off from anterior or especially left-anterior part of the ascending aorta, we suggest to switch to the right radial approach and not to lose much time on the femoral one.

<Learning objective: The aim of this case is to show superiority of the right radial approach in engaging anomalous RCA coming high from ascending aorta. If you see an anomalous RCA originating highly from anterior or antero-left part of the ascending aorta, do not waste much time trying to engage it from femoral approach, as we did, it's almost impossible. Switch to the right radial approach using simple JR, or even better, LCB catheter, and you will succeed.>

Introduction

The incidence of coronary artery anomalies is generally reported to be around 1%. However, higher numbers such as 5.6% were also reported [1]. This variable percentage is derived from angiographic and necropsy studies, which are influenced by entry biases and unclear criteria.

An anomalous right coronary artery (RCA) with a high anterior take-off from ascending aorta is an uncommon and technically challenging vessel to cannulate. There are only a few reports in the literature describing this anomaly [2–6]. Some of them consider it as a "very rare" or even "extremely rare" [3,6] anomaly.

It is important for the surgeon to be aware of that anomalous artery and to know its course, because its origin can be in the place of the usual (routine) aortotomy for cannulation, or it can travel through the site of the planned proximal saphenous vein graft (SVG) anastomosis. Even more important is to know if the proximal part of the anomalous RCA has an intramural course. Preoperative computed tomography (CT)-angiography could be of paramount help. Otherwise, the surgeon can cut it off during aortotomy, which has been the case on several occasions, according to some case reports [3]. It may lead to perioperative myocardial infarction (MI), which can be more serious in non-bypass patients, with intact coronary arteries and untrained myocardium.

Case report

Here we present a case of anomalous RCA arising from antero-left part of the ascending aorta, 3 cm above the sinotubular junction.

A 56-year-old woman presented to our clinic with class III angina and dyspnea on exertion. She was hypertensive, had history of MI, no diabetes mellitus, and no serious comorbidities. Electrocardiography showed sinus tachycardia, left-anterior hemiblockage, and deep QS waves in V_{1-3}. Echocardiography showed anterior and antero-septal hypokinesia, severe mitral regurgitation, slight left ventricular and left atrial enlargement, and ejection fraction 49%. Chest X-ray was normal. Laboratory results were normal except for a high erythrocyte sedimentation rate of 46 mm/h and mild anemia with hemoglobin of 10 mg/dl. A coronary angiography was performed in another clinic a few days before presentation. Left main coronary artery was normal, left anterior descending (LAD) artery was cut off from ostium, left circumflex artery (LCX) had OM_1 cut off from ostium, OM_2 with moderate lesion at proximal portion, and subtotal lesion at distal LCX proper.

* Corresponding author. Tel.: +994 503229299.
E-mail address: eyvaz_abbasov@yahoo.com (E. Abbasov).

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RCA could not be engaged from the femoral approach, and the operator performed aortic root angiography with a pigtail catheter (Fig. 1). The RCA could not be visualized well enough, but he reported a significant lesion in mid RCA and referred the patient for coronary artery bypass graft surgery (CABG). The patient refused to be operated at that clinic, and was admitted to ours. Our cardiac surgeon refused to operate without selective RCA injection and demanded repeat angiography to selectively engage the RCA to visualize distal LAD filling through heterocollaterals, if they existed.

We started via the right femoral approach with a 6 Fr introducer. First, we took 6 Fr JR 4.0 diagnostic catheter. Then 6 Fr JL 4.0, AL I and II, MPB 1 and 2 catheters were used, but neither was successful. We then reviewed thoroughly aortography from previous angiography once again, and decided to use the right radial approach, because it appeared anatomically more suitable. A 6 Fr introducer was placed into the right radial artery. We took 6 Fr JR 4.0 diagnostic catheter and easily engaged the anomalous RCA on the first attempt. The RCA was originating from left-anterior side of the ascending aorta, 3 cm above the sinotubular junction (Fig. 2). After traveling 3 cm vertically downward, it turned to the right and went in its usual way. It had a significant lesion at mid portion, was dominant, and was supplying LAD by heterocollaterals via septal branches. Distal LAD appeared to be suitable for bypass surgery and the patient was scheduled for CABG. Also a 64-slice CT-angiography was performed before the operation, to see if the proximal part of the RCA had an intramural course (Fig. 3).

She underwent CABG with left interior mammary artery-LAD, SVG-OM_1, and SVG-posterior descending artery grafts. Surgery was without any complication, but she died at night of the operating day probably from sudden graft thrombosis.

Discussion

An anomalous RCA with a high anterior take-off from ascending aorta is an uncommon and technically challenging vessel to cannulate. There are only a few reports in the literature describing this anomaly [2–6]. Some of them consider it as a “very rare” or even “extremely rare” anomaly [3,6]. Here we present a case of anomalous RCA arising from antero-left part of the ascending aorta, 3 cm above sinotubular junction.

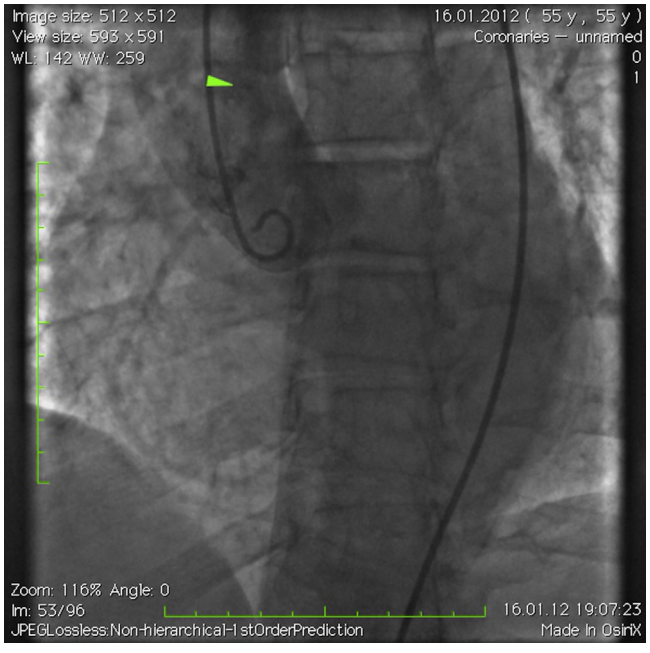

Fig. 1. Aortic root angiography showing probable right coronary artery origin.

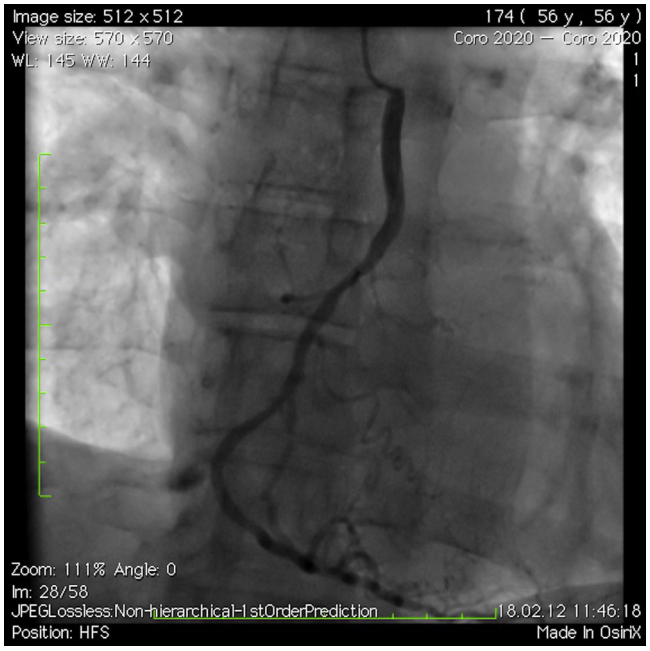

Fig. 2. Antero-posterior view showing anomalous high right coronary artery takeoff from the left-anterior part of the ascending aorta.

Fig. 3. Computed tomography-angiography (64 slice) showing anomalous right coronary artery origin.

It is important for the surgeon to be aware of that anomalous artery and to know its course, because its origin can be situated in the place of usual (routine) aortotomy for cannulation, or it can travel through the site of the planned proximal SVG anastomosis. Even more important is to know if the proximal part of the anomalous RCA has an intramural course. Preoperative CT-angiography could be of paramount help. Otherwise, the surgeon can cut it off during aortotomy, which has been the case on several occasions, according to some case reports [3]. It may lead to perioperative MI, which can be more serious in non-bypass patients, with intact coronary arteries and untrained myocardium.

The radial approach has been used for coronary angiography since 1989 and for interventions since 1992. The proportion of radial procedures has continued to rise worldwide with radial access now replacing femoral access as the dominant access site for angiography and percutaneous coronary interventions in some countries. Worldwide, an estimated 20% of procedures are performed by this route (29% if the USA is excluded from the estimate)

[7]. Although, there is considerable variation across Europe and Asia/Australia, these regions have the highest uptake of radial access at ~30% and 40% of procedures, respectively. The countries with the highest rates of radial access (70–80%) are Norway, Malaysia, and Bulgaria. Central and South America have a lower rate of radial use, estimated at 15%, and North America has a major divergence between Canada at ~50% and the U.S. at less than 2% [7]. Radial access has the advantage of having less bleeding complications, easy compressibility, mobility, and more comfort for the patient, with early discharge times. Although femoral vascular closure devices have improved early ambulation and patient comfort, they have not demonstrated a reduction in bleeding and vascular complications.

Many operators prefer the right arm approach as it provides an easier platform for access and is generally more comfortable for the patient and operator. Other considerations affecting the choice of right or left radial access include the presence of a left internal mammary artery graft and the possible future need for a bypass graft conduit from the nondominant hand. Short statured patients, as well as patients with significant abdominal obesity, tend to have longitudinally compressed ascending aortas, and cannulation is often easier from the left radial artery. Evaluation and treatment of infradiaphragmatic pathology is best performed from the left wrist as it provides ~10 cm of additional length. Left subclavian and left vertebral interventions are also straightforward from the left wrist. Finally, because left-sided radial procedures more closely mimic the femoral approach in terms of catheter manipulation and seating, operators, particularly those early in their learning curve, may find it easier for using more familiar femoral (Judkins) catheters.

But here, we describe a case, in which right radial approach has an absolute advantage over femoral and left radial (as it mimics femoral route) ones. So, it proves once again, that every interventional and invasive cardiologist should be familiar with and be able to perform angiography from various access sites.

Conclusion

In patients with anomalous high RCA take-off from anterior or especially left-anterior part of the ascending aorta, we advise switching to the right radial approach and not to lose much time on the femoral one.

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